REMARKS

In the Office Action dated October 9, 2003, claims 11-18, 20- 28 and 30 are pending and all claims are rejected. The rejection is made final. Reconsideration is requested for at least the reasons discussed hereinbelow.

The above amendment is submitted to more particularly point out and distinctly claim the subject matter regarded as invention. The amendment address the Examiner's remarks on page 9 of the office action and does not present new issues. Therefore, it is requested that the amendment be entered.

The Examiner has agreed with Applicant that the modification in the claims changing the "wear resistant cutting blade edge" to a "non-cutting blade edge" doe not constitute new matter because Applicant disclosed a "non-cutting blade edge" in the original Abstract to the specification. However, nevertheless the Examiner rejects claim 12 advising new matter is included because the original specification discloses elements relating only to the wear-resistant cutting blade edge.

Applicant disagrees strongly. The original application is in the German language. The original translation states:

> The cutter blade 8 can be produced as a punched part by punching from a flat blank of sheet metal or wear-resistant sheet metal, with the invention not being limited to the mentioned examples of embodiment. Instead, unmentioned suitable materials and semifinished products can also be used, if they are within the scope of the patent claims. In particular, this is true for composite materials, fiber composition materials, or high-strength materials or ceramic or fiber-composite ceramic elements.

> The cutter blade 8 according to Figure 1 is provided with a non-cutting blade edge 12 on the leading flat side 11 viewed in the direction of advance 9, at a right angle to the flat side 11 when a simple punched part is used. In this case the blade thickness can be comparatively small.
>
> The blade thickness can be 0.1 mm - 5.00 mm. The blade thickness is preferably 0.2 - 1.00 mm.
>
> In particular, the blade thickness should be no greater so that the tangential angle of the flank of the leading blade edge 12 is close to or equal to zero.

See page 5, lines 10-21.

Thus, it is seen that the original translation teaches cutting blade 8 with a non-cutting blade edge 12.

Although the Substitute Specification was intended to help the original translation, it was not successful at this point.

A translation of the original German application (which was made for the corresponding European patent application, now granted) confirms the original translation on this point. See copy of translation "IN THE MATTER OF European Patent No. 1 187 690" attached hereto as Exhibit A [see, page 5, line 20 through page 6, line 2].

Thus, in the original specification, Applicant teaches that the invention is a "cutter blade 8 according to Figure 1 is provided with a non-cutting blade edge 12 on the leading flat side 11 viewed in the direction of advance 9, at a right angle to the flat side 11." The wear-resistant feature, coating 15 on the leading flat face, is a preferred embodiment of the

invention. The undue emphasis on this preferred embodiment in the Substitute Specification was misleading and not in accord with the original specification.

Claims 12 and 22 are rejected under 35 U.S.C. §112, first paragraph. As discussed above, and confirmed with the enclosed translation of the original German application, which was provided for European Patent 1 187 690 granted on the corresponding application in the EPO, the original specification teaches a "cutter blade 8 according to Figure 1 is provided with a non-cutting blade edge 12 on the leading flat side 11 viewed in the direction of advance 9, at a right angle to the flat side 11." A preferred cutting blade of the invention is "produced as a punched part by punching from a flat blank of sheet metal or wear-resistant sheet metal." It would be recognized by those skilled in the art that such production does not produce a "cutting edge." A "cutting edge" requires a "hook angle," which is the acute angle of the leading surface of the blade, or a "relief angle" which is an acute angle to the work surface, or both (see, e.g., "Exhibit B). In the cutting blade of the present invention the leading surface is a plane stamped from sheet metal; there is no acute angle of the leading surface; further, the end is substantially at right angle to the leading surface. Thus, the non-cutting blade egde of the present invention has neither the hook angle nor the relief angle.

Therefore, the amendment restores the claims and the specification to its orignal scope and meaning.

Claims 11-30 are rejected under 35 U.S.C. §112, second paragraph. The Examiner alleges that, although the term "cutter blade" is used by the claim to mean a

tool without cutting edges, the accepted meaning clearly involves a tool with cutting edges. Applicants strongly disagree. In U.S. Patent 4,205,799 (a copy of which is enclosed as Exhibit C), a perspective view of a cutter blade is shown in FIG. 6 as follows:

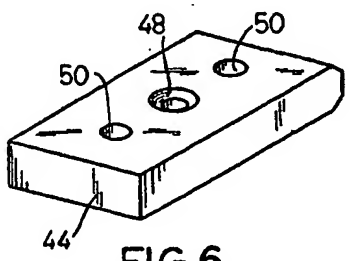

FIG. 6

As further illustrated, for example, in FIG. 8, the working face of the this cutter blade is side 44.

Therefore, contrary to the Examiner's assertion, it **is accepted** that a cutter blade is **not** required to have a "cutting edge."

The specification clearly define a milling tool having a cutting blade provided with a non-cutting edge. Applicant respectfully submits that this terminology is not indefinite and would be understood by those skilled in this art. Because the claimed invention is used in making sand molds, those skilled in the art would understand that the non-cutting edges of the milling tool will provide for removal of the sand mold material in a chipless manner. To the contrary, a tool with a cutting edge would cause chips (or larger portions) of the molded sand and wear quickly, causing damage to fine mold contours.

In making foundry sand casting molds, it is important for the removed material to be powdery, and not form splinters or chips, in order to avoid degradation of fine details in the mold surface. For this reason, the shank end tool in accord with the present invention must not have a cutting edge. Further the shank end tool should exhibit a small weight in comparison to the shank so that no vibrations develop. Thus, the shank end tool of the present invention has a thickness less about 5 mm or less. None of the cited art suggest such a shank end tool as taught and claimed in the present application.

Foundry sand casting molds are made from a block of san bonded together with a synthetic resin. This is the same type of material of which grinding wheels are made. It can be readily appreciated that a cutting tool having a traditional wedge shaped cutting edge is not suitable for cutting a grinding wheel; thus, it can be appreciated that tools with cutting edges also are not suitable for machining foundry sand casting molds. Thus, the present invention provides a shank end tool without cutting edges in order to mill the foundry sand casting molds. None of the cited art suggest such a shank end tool.

The JTEC/WTEC Panel Report on "Rapid Prototyping in Europe and Japan" March 1997, page 106 (copy provided in Exhibit D, attached hereto; see, also, www.wtec.org/loyola/rp/toc.htm)) a summary of metal casting applications in the U.S. DIRECT MOLD MILLING (DMM) is not mentioned.

Since summer 1999, ACTech have used this invention (application priority date

of June 24, 1999) for DIRECT MOLD MILLING (DMM) of the molding material as a new Rapid Prototyping mold making technology in addition to known Direct Croning® techniques. This procedure is able to generate mold segments with sizes much bigger than the known building dimensions of laser sintering equipment. At present, ACTech use equipment for mold segments up to an external dimension of **2.5 m**. As an example of use of this new technology, the manufacture of large-surface car body structures that are produced as die casting parts in later series production or as pre-casted patterns accurate in size and this technology is able to reduce the milling time for dies to a fraction.

In this procedure, it is not necessary to produce a pattern equipment which is consuming a lot of costs and time. The mold is directly milled into a block of molding material. The size of the applied mold is only limited by the mechanical strength of the molding material used and the available milling equipment. The five-axis CNC-milling machine used at ACTech allows dimensions up to 2.400 x 1.400 x 800 mm for a single mould segment. However, by dismantling of the needed mould in segments also larger moulds can be set up.

Claims 11-15, 18, 19, 21-25, 28 and 29 are rejected under 35 U.S.C §102(b) over Williams (U.S. 2,621,548). Williams is directed to a mounting for cutting tools, "particularly cutting tools of the rotating type, such as drills, countersinks, counterbores, and the like, which are commonly employed for the performance of various cutting operations" [col. 1, lines 2-5]. Although the cutting inserts are not illustrated in great detail, **b caus th inv ntion is to the mounting**, nevertheless,

the description clearly states that the insert tool 4 is composed of high speed tool steel and "is provided with cutting edges 5 disposed at an angle to each other so that the tool 4 will serve as a drill when rotatably driven." [Col. 2, lines 44-53; emphasis added.] Thus, the insert of Williams cannot merely be stamped from a sheet of steel. Instead, a cutting edge 5 must be ground onto the insert at an angle to provide the cutting.

Thus, the teaching of Williams is contrary to the present invention which requires non-cutting edges. The tool of the present invention will not serve as a drill when rotatably driven. The edges of the tool of the present invention merely knock particles of molded sand away from the mold to provide a desired surface contour in a chipless manner. This permits the advantages described in the present specification.

Contrary to the assertions of the Examiner, Williams does not show rounded leading or trailing edges in figures 2a and 2b. In FIG. 2a, Williams shows a five sided profile having cutting edges 5a. The cutting edges are not rounded. There is no suggestion whatsoever in Williams for cutting edges 5a to be rounded; nor is there any hint of a suggestion for trailing edges to be rounded. That would be contrary to the teachings of Williams. Regarding FIG. 2b, although the profile of the tool as a rounded forward side, the cutting edge 5b is not rounded; nor is there any hint of a suggestion that the cutting edge be rounded.

As best shown in Figs. 6 and 10, each form of shank I or 1a provides **chip** removing grooves 13 starting on opposite sides of the insert tool 4 or 13 and extending

spirally around the outside of the shank.

To the contrary, the present invention provides a shank tool without a cutting edge, so that during the high-speed treatment of foundry sand casting molds no chips can develop. The sand waste when milling must be removed by vacuum.

Because Williams fails to teach or suggest the presently claimed shank end tool without cutting edges, Williams also fails to teach or suggest the claimed methods.

Claims 16 and 26 are rejected under 35 U.S.C §103(a) over Williams in view of Schweikert et al. (U.S. 5,222,842). Williams is discussed in detail above. Schweikert **fails** to make up for any of the deficiencies in Williams. Claims 16 and 26 still require a shank end tool without a cutting edge. The Examiner cites Schweikert for a teaching of a cutter blade having a convex face. However, Schweikert clearly teaches tools having cutting edges. See, particularly, FIGs. 5 and 6 showing cutting edges 26, 30 (FIG. 5) and 36, 40 (FIG. 6). There is not even a hint of a suggestion in Schweikert for a shank end tool without a cutting edge.

Thus, it is not seen how the presently claimed shank end tool with non-cutting edge would have been obvious to one of ordinary skill in the art from any combination of Williams and Schweikert.

Claims 17 and 27 are rejected under 35 U.S.C §103(a) over Williams in view of Ogawa (U.S. 5,597,269). Williams is discussed in detail above. Ogawa **fails** to make

up for any of the deficiencies in Williams. Claims 17 and 27 still require a shank end tool without a cutting edge. The Examiner cites Ogawa for a teaching of a blade that includes a shovel-like arrangement. However, Ogawa, clearly teaches tools having cutting edges. See, particularly, FIG. 1, cutting edge 4 with a lip angle "α" and a rake (or hook) angle "θ." At col. 2, lines 10-13, Ogawa states:

> [a]ccording to the present invention, the cutting tool has a plurality of spiral blades and each of the blades has a **keen cutting edge** with an **extremely acute angle** which comprises a radial edge portion and a bottom edge portion.

[Emphasis added.] There is not even a hint of a suggestion in Ogawa for a shank end tool without a cutting edge.

Thus, it is not seen how the presently claimed shank end tool with non-cutting edge would have been obvious to one of ordinary skill in the art from any combination of Williams and Ogawa.

a cutter blade further comprises a curved surface having a convex face or a bent surface, parallel to the longitudinal axis, with the convex face of the curved surface or of the bend pointing in a direction of rotation of the shank in use"

Claims 20 and 30 are rejected under 35 U.S.C §103(a) over Williams in view of Freitag (U.S. 3,540,315). Williams is discussed in detail above. Freitag **fails** to make up for any of the deficiencies in Williams. Claims 20 and 30 still require a shank end tool without a cutting edge. The Examiner cites Freitag for a teaching of a cutter with a hollow cylindrical shank for cutting through Styrofoam.. However, Freitag, clearly

teaches tools having cutting edges. See, for example, cutting edge 42 (FIG. 3) and 70 (FIG. 7). There is not even a hint of a suggestion in Freitag for a shank end tool without a cutting edge.

Thus, it is not seen how the presently claimed shank end tool with non-cutting edge would have been obvious to one of ordinary skill in the art from any combination of Williams and Freitag.

None of the prior art teach shank end tool that can provide machining of foundry sand casting mold materials **without chip production**, for the manufacture of heat-resistant casting moulds, **in particular of sand mould containing binding agents** for the manufacture of casting moulds made of metal. Nor does the cited art provide a cutting blade that can be a stamped part from a flat cut piece of steel, wear-resistant steel, or a suitable wear-resistant material produced by stamping, and with an outer blade surface (thickness end) standing at right angles to the flat major side.

It is respectfully submitted that the subject application is in a condition for allowance. Early and favorable action is requested. If any issues remain after consideration of this response, the Examiner is requested to call applicant's attorney to attempt to resolve those issues expeditiously.

If for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, the Commissioner is hereby authorized and requested to charge Deposit Account No. **04-1105**.

Respectfully submitted,

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